

KIT 84. MAINS RELAY BOARD

Many electronic projects use a low voltage circuit of some description - timer, light sensor, dark sensor, temperature sensor, movement detector etc. - and give out a signal when a certain predetermined state is achieved or detected. This signal typically is a rising or a falling 12V pulse. And typically this pulse is meant to turn on a mains powered piece of apparatus, eg, a light or motor. It is at this point that the projects do not really know what to do. Many put a relay on-board but then say do not connect this to the mains. Or others just leave the output 12V pulse at a solder pad and leave you to use it to connect it 'somehow' to the mains.

This relay board kit is specifically designed to overcome these problems. It interfaces between a low voltage signal input and operate a mains-switching relay. It has the following features:

- switches on rising or falling 12V input
- LED indicator when relay is on
- fuse protected output

A UL-approved Goodsky 12V DPDT (double pole, double throw) relay is used in the kit. It has contacts rated at 5A/250VAC. It is completely sealed (SS) from dust. The coil resistance is about 270 ohm. The current consumption at 12V is a nominal 45mA. The life expectancy is over ten million operations. The pin out is shown on the overlay.

The 12V power to the relay and the switched ground or switched supply inputs are shown on the left of the PCB. The switched mains supply is on the right of the board. The active and neutral inputs are in the centre of each terminal block. The Normally Closed and Normally Open relay outputs are indicated.

Construction. It is generally easiest to add the lowest height components to the PCB first - the resistors and diodes. Then add the transistors, LED and remaining components. Make sure not to mix up the BC548 & BC558. Also make sure to get the diodes around the correct way. The bar on the diode corresponds with the bar on the overlay.

The two 2-pole terminal blocks on the input side slide-fit together. However the two 3-pole terminal blocks on the output have been deliberately spaced apart from each other.

It is very important that the relay board be firmly housed in a suitable case before any mains power is applied to it. Mains leads must be independently tied down so there is no tension on the wires when they enter the output terminal blocks. Make sure no water can enter the box. You must take every possible precaution to avoid the risk of electric shock during construction and then when the relay is operational. If you have doubts about how to deal with mains construction projects then seek the advice of a qualified electrician. If you have some conformal coating then this should be added to the PCB after final testing.

Operation & Testing. The circuit is text-book transistor switching with protection diodes. The relay is switched by transistor Q1. The relay has the standard diode to protect it from back emf when it switches. Q2 provides an inverting stage to allow ground switching. D2 should prevent any damage to the circuit if the wrong polarity is attached to the board. The mains side is protected by a standard 250V/5A fuse. The LED will turn on when the relay is turned on.

Test the relay first without any mains supply attached. Just connect the 12V and ground supply then use a flying wire to switch between ground and high, and high & ground. You should be able to hear the relay click on/off. When you are happy that the input side works then connect the mains supply. You should know how to distinguish the earth, neutral and active mains leads. If not then ask someone who does.

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If you have a question send me email at

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COMPONENTS

Resistors 5% 1/4W:		
47K yellow violet orange	R4 R5	2
1K brown black red	R2	1
10K brown black orange	R1 R3	2
1N4148		2
1N4004		2
BC548		1
BC558		1
3 pole terminal block		2
2 pole terminal block		2
Goodsky relay MI-SS-212L		1
5mm LED		1
Fuse holder & cap		1 set
5A/250V fuse		1
Kit 84 PCB		1

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